

MODIFIED WORK PLAN FOR
CONTAMINATED SOIL & GROUNDWATER INVESTIGATION
FORMER ACCRA PAC SITE
INDUSTRIAL PARKWAY
ELKHART, INDIANA

PREPARED
FOR
WARNER BAKER ESTATE
NOVEMBER 18, 1988

PREPARED
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1.0 INTRODUCTION

This work plan, prepared by EIS Environmental Engineers, Inc. (EIS), is submitted by the Warner Baker Estate in accordance with subparagraphs D and E of the Administrative Order entered into by the U.S. Environmental Protection Agency, Region V (USEPA) and Warner P. Baker. The Order addresses soil contamination on property owned by the late Mr. Warner Baker which is located at 2600 Industrial Parkway, Elkhart, Indiana. Warner P. Baker agreed to accept the Order on July 16, 1986 and the Order became effective upon signing by the USEPA Regional Administrator on August 6, 1986.

EIS prepared this Work Plan under a letter of authorization issued on May 10, 1988 by Malcolm J. Tuesley, Jr., Esq., of Mirkin, Tuesley & Miller.

The work plan will address the work required to define the nature and extent of the soil and groundwater contamination which has been identified at the former Accra Pac site. Remediation methods can be considered only after the tasks related to the site investigation have been completed. Therefore a Remedial Action Plan will be prepared after the site contamination has been defined. That plan will be prepared in consultation with representatives of the USEPA.

1.1 Objective

The work plan will address the tasks required to meet the following objectives:

Conduct a hydrogeologic investigation to characterize the geological conditions at the site including the direction and gradient of the groundwater flow.

off-site?
Determine the spatial extent of groundwater contamination at the site.

Determine the limits of the areal and vertical extent of soil contamination in the saturated and unsaturated zones in the area where the underground tanks were located and all visibly contaminated soil at the facility.

The USEPA had allowed the continued disposal of solvent contaminated soil or debris resulting from a response action for the past two years under an exemption from the 40 CFR PART 268 ban of land disposal of solvent waste. This exemption expired on November 8, 1988. Options other than the off-site treatment/disposal of contaminated soil will likely have to be considered. These options will be evaluated and presented in the Remedial Action Plan. The options would by economic necessity most likely include on-site or in-situ treatment/disposal methods.

1.2 Site History

The site located at 2600 Industrial Parkway Elkhart, Indiana was formerly operated as an aerosol packaging plant by Accra Pac Group Inc. On January 1976 an explosion and fire totally destroyed the facility. The property was purchased by Warner P. Baker in January 1977. At that time, the structures on the 225 feet by 400 feet parcel of land included a cement slab from the former Accra Pac building and thirteen underground tanks which held materials used in the aerosol packaging operation. After screening the potential threat that might be posed by the underground storage tanks, the USEPA issued a consent order to Warner P. Baker to remove, transport and dispose of the tank contents and the tanks and determine whether soil contamination exists and, if so, remove the contaminated soil.

The tank contents (approximately 33,500 gallons) were removed and transported to LWD, Inc. in Calvert City, Kentucky for disposal. Those materials were manifested as a hazardous waste. The tanks were excavated and placed in the loading dock area of the former plant until they could be decontaminated and scrapped. The removal of the tanks and their contents was monitored by a USEPA Contractor, Weston SPER of Chicago, Illinois. Following removal of the tanks, Weston SPER sampled and analyzed soil from the three excavated pits and from piles of soil removed during the tank excavation. These pits were identified by them as Pit A, Pit B and Pit C.

In addition, Weston SPER sampled and analyzed water standing in the bottom of the three excavated pits and installed four groundwater monitoring wells on and to the south of the site. These wells were all sampled by Weston.

The results of the analysis of the samples collected by Weston SPER are included in an interim report was submitted on June 25, 1987 to the Emergency Response Section, Western Response Unit, USEPA Chicago, Illinois. A copy of the Weston interim report without the hazardous waste manifests, Chain of Custody and laboratory report forms is included with this Work Plan. (Appendix A)

1.3 Project Administration

Implementation of the tasks described in this work plan will be administered by EIS Environmental Engineers, Inc. (EIS). EIS will function as the Respondents Project Coordinator. In this capacity EIS will be responsible for technical planning field work, laboratory analysis, interpretation of data and report preparation.

The tasks required to meet the stated objective in a responsible, timely manner are described in the following sections of the Work Plan.

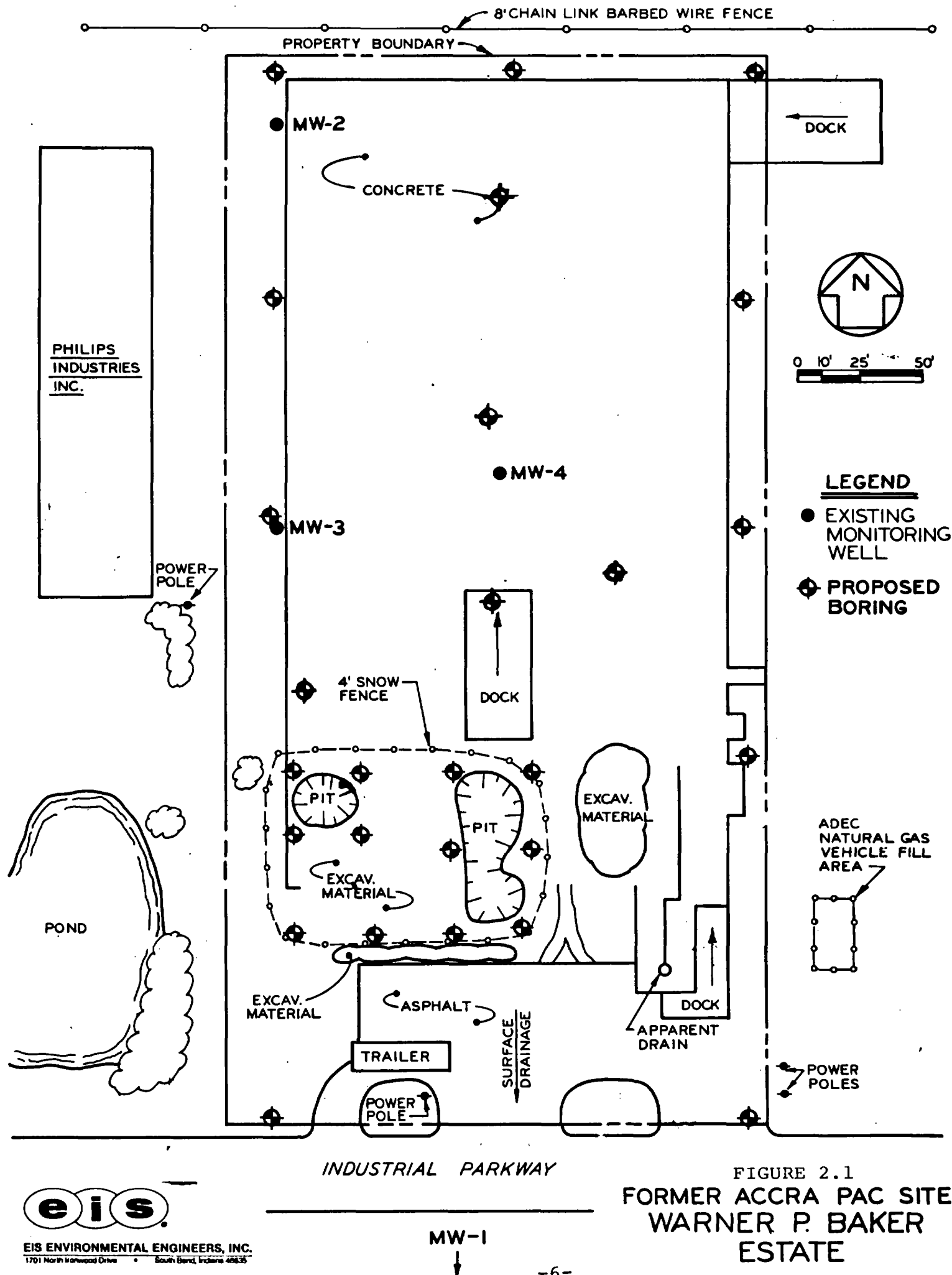
2.0 FIELD AND LABORATORY INVESTIGATION

2.1 Field Investigation

The objective of the field investigation is to collect soil and groundwater samples and other pertinent data which will allow delimiting of the areal and vertical extent of contamination at the site. This investigation will include the collection of soil and groundwater samples from up to 27 borings at the approximate locations identified in Figure 2-1. The number of borings may be exceeded in order to provide sufficient data to allow the extent of soil and groundwater contamination to be defined. The location of these borings may also vary from those identified in Figure 2.1. The final boring location will be determined by the field geologist or engineer in conjunction with the USEPA project coordinator.

The actual locations and number of borings and samples will be sufficient to allow for delineating the contaminated soil which may ultimately have to be removed. The proposed borings have been located around and between the pits remaining from the tank excavation as well as other locations on the site.

Because the soil within the excavation has been previously determined to be contaminated, additional sampling of the pits and the excavated material is not required to be consistent with the objective of defining the extent of the contamination.



If soil or groundwater contamination is identified by analysis at any of the boreholes identified in figure 2.1, an additional boring will be made outward from the boring where the contamination has been confirmed by laboratory analysis. This procedure would continue outward until the areal and vertical extent of the contaminated soil has been defined. Soil vapor analysis will be utilized to locate these additional boreholes.

Soil borings adjacent to the building slab will be used to determine whether water used to fight the fire or leaks from process piping may have carried contaminants across the slab and contaminated the surrounding soil. Should contaminants be identified in the proposed borings adjacent to, or through the slab, additional soil borings would be performed on the soil and groundwater underlying the former factory floor. The additional borings would move inward or outward until it has been determined that soil contamination is not present. In addition, an inspection of the slab will be made to determine whether cracks, joints or other penetrations of the slab exist which may have allowed the infiltration of water borne contaminants during the fire fighting operation.

This Work Plan does not address any field investigation beyond the boundary of the Warner Baker Estate property line.

2.1.1 Boring and Sampling in Unsaturated Zone

Soil Borings will be performed in accordance with ASTM-Test Method D-1586. This procedure, which is routinely employed in unconsolidated deposits, uses a truck or trailer mounted rig such as a CME-75 or a D-25. Hollow-stem augers are used to advance the borings. Continuous soil samples will be collected from the surface to the water table which varies between depths of 6 to 15 feet. These soil samples will be used to determine the lithology of the subsurface materials underlying the site. The split-spoon will be driven thorough an 1.5 feet interval by an 140 pound hammer dropped through a vertical distance of 30 inches. At the completion of the borings, all bore holes will be grouted with a bentonite/cement slurry through their entire vertical depth. This will minimize the potential for the accelerated vertical movement of contaminants.

2.1.2 Boring and Sampling in Saturated Zone

In the saturated zone, split-spoon samples will be collected at three (3) foot intervals and groundwater samples will be collected at approximately five (5) foot intervals. A screened (4.0 feet of 0.010 inch screen) hollow stem auger will be used as the lead section of the auger string. The screened auger will allow infiltration of groundwater at discrete depths

while drilling through the saturated zone. The discrete water sample will be collected using a double check valve, Teflon bailer. The water sample will be collected prior to retrieval of a soil sample with the split-spoon sampler. Drilling in the saturated zone will continue to a depth of 30.0 feet below grade or until field analysis using a PID analyzer for Volatile Organic Compound (VOC) headspace analysis indicates a background VOC concentration.

Should it be necessary to wash the borehole prior to split-spoon sampling, a sample of each tank of wash water will be collected and analyzed for Volatile Organic Compounds.

2.1.3 Field Analysis

The split-spoon soil samples and the groundwater samples will be screened in the field for Volatile Organic Compounds. A PID analyzer (HNU or TIP II) will be used for conducting a head-space analysis of the sample. The following headspace procedure will be utilized.

1. Fill a clean soil sample jar half-full with sample.
2. Cover the mouth of the jar with aluminum foil.
3. Shake the jar for five seconds.

4. Allow the jar to stand for approximately two minutes in an area that will have a relatively constant temperature throughout the sampling period. Record ambient temperature.
5. Punch the PID analyzer probe through the aluminum foil covering the mouth of the jar and record the PID measurement.

These data will be compared to the results of the laboratory analysis to correlate the PID measurements with the laboratory analytical data. Because the major contaminants have already been identified, this correlation may be used to expand the investigation area and during remedial activities for field checking of relative contamination.

2.1.4 Sample Collection

Soil samples collected for possible laboratory analysis will be collected from each boring at 3.0 foot intervals or more frequently as determined by field head-space measurements with the PID analyzer. The samples to be submitted to the laboratory for analysis will be collected from the split-spoon sampler immediately upon opening the sampler. Groundwater samples will be collected for possible laboratory analysis at intervals of approximately five (5) feet

using a Teflon bailer. The decision regarding which of the samples will be submitted for analysis will be based on a review of the field PID analysis. The samples to be analyzed for Volatile Organic Compounds (VOC) will be placed into labeled 40cc glass vials with Teflon septa caps and then placed into iced coolers. Samples will be collected in duplicate to be used for Quality Assurance analysis and in case of inadvertent loss or breakage of a sample vial. Soil samples collected for the purpose of describing the lithology will be put into labeled soil sample jars.

2.1.5 Equipment Decontamination

The split-spoon sampler and the Teflon bailers used to obtain subsurface soil and water samples will be decontaminated after each use. After sample collection, the split-spoon sampler will be rinsed in a bucket containing tap water with a laboratory detergent and brushed until no soil particles can be seen. The initial wash will be followed by a deionized water-rinse, a methanol rinse, and a final deionized water rinse. The Teflon bailers will be washed with a laboratory detergent followed by a deionized water rinse, a methanol rinse and a final deionized water rinse or until soap and solvent are removed.

In order to prevent cross contamination, the augers and drill rods will be pressure washed or steam cleaned between each boring.

2.1.6 Groundwater Monitoring Well Installation

The analytical data obtained during the soil boring and sampling will be used to determine the location and depth of the groundwater monitoring wells. The installation of a monitoring well at an arbitrary depth may result in a false representation of a contaminants vertical distribution. This would most certainly be the case if the contaminant was not evenly dispersed in the aquifer.

Because physical characteristics, such as solubility or density, may cause a contaminant to become stratified the water samples collected from the saturated zone during the soil sampling will be used to determine the elevation of the well screens.

At least one monitoring well will be placed upgradient from the former tank locations, but within the property boundary. Monitoring wells will be constructed of precleaned 2 inch diameter, PVC with flush joint threaded connections. No solvents will be used. The annular space will be grouted from the top of the

screen to grade with a cement or a bentonite/cement grout. The well casing will be protected above grade with a steel protective cover w/locking cap. The steel cover will be set into a 2 foot square concrete pad at grade.

The monitoring wells will be developed and surveyed to 0.01 foot at the top of the casing and at ground level, then referenced to a site benchmark. The existing monitoring well casings will also be referenced to the site benchmark. When the static water level in the wells has equilibrated the new wells and the existing wells will be sampled and analyzed for VOC.

2.1.7 Field Data Collection and Documentation

Boring and sampling procedures will be supervised by an EIS geologist or engineer. The geologist or engineer will compile a detailed boring log that describes: the visually determined grain-size distribution of each soil sample; macroscopic evidence of contamination; PID measurements; depths of sampling intervals; and other pertinent data. In addition, the geologist or engineer will clearly mark the location of each boring and map the location on a dimensioned site base map. The geologist will maintain Chain-of-Custody for all analytical samples and insure that the samples are

delivered to the EIS laboratory in South Bend, Indiana. Chain-of-Custody documentation will be initiated at the sample collection point (and follow the procedures detailed in Section 3.2.4).

2.2 Laboratory Analysis

2.2.1 Chemical Analysis

Samples received by the EIS laboratory will be removed from the sample coolers, logged in and immediately placed in the walk-in cooler until extracted. The samples will be analyzed within 14 days of the date they were collected.

The analysis of soil/water samples will follow USEPA Methods 5030 and 8240 (Purge and Trap, Gas Chromatography/Mass Spectrometry). A detailed description of analytical laboratory procedures is presented in Section 3.3.

2.2.2 Physical Analysis

Sieve analysis and permeability tests will be conducted on soil samples from areas identified as having contaminated soil. These data will be used along with the results of the chemical analysis to determine the type of remediation that may be required.

3.0 QUALITY ASSURANCE/QUALITY CONTROL PLAN

3.1 Introduction

The success in meeting the objective of the response action for the Warner Baker Estate/Accra Pac site will be greatly dependent on the quality of data generated during the project. To ensure the highest quality data possible, a project specific Quality Assurance/Quality Control Plan (QA/QC) will be implemented. This plan will include operational guidelines for the following two major project areas:

- o Field Sampling Activities
- o Laboratory Analysis Activities

The primary objective of this QA/QC plan is to guarantee that all data generated in the investigation are of sufficient quality to allow a well informed evaluation of the site conditions.

Data quality is limited by the following parameters which this plan will address:

- o Completeness - the adequacy in quantity of valid measurements both to ensure accurate interpretation and to answer all important questions.

- o Representatives - the extent to which discrete measurements accurately describe the greater picture which they are intended to represent. Good representatives is achieved through careful, informed selection of sampling sites, boring sites, depths and analytical parameters.
- o Accuracy and Precision - the agreement between a measurement and the true value and the degree of variability of the measurement. Accuracy and precision of data collected in the remedial investigation will depend upon the measurement standards used and the meticulous, competent use of them by qualified personnel.

3.1.1 Project QA/QC Personnel Responsibilities

Quality Assurance Officer: This individual is in charge of all EIS QA/QC activities and is responsible for formulating project specific QA/QC plans, reviewing all field and laboratory information generated and accepting or rejecting the generated data.

Project Manager: The project manager's responsibilities include review of all project data, scheduling of activities, correspondence, direct reporting to the Quality Assurance Manager and archiving of all project generated data.

Health and Safety Officer: This individual is in overall charge of all health and safety considerations applicable to this project. The Health and Safety Officer coordinates his/her activities with the Project Manager. The decisions of the Health and Safety Officer are final with respect to controlling worker-adherence to the Health and Safety Plan.

Laboratory Manager: The laboratory manager's responsibilities include overall management of laboratory activities, adherence to laboratory QA/QC procedures, scheduling of laboratory resources and reporting directly to the Quality Assurance Manager.

Sampling Geologists/Engineers: The geologists/engineers responsibilities include collecting soil samples, performing borings, conducting field measurements, maintaining equipment cleanliness, performing proper decontamination procedures and carrying out the work according to the Project Work Plan.

Sample Custodian: The sample custodian is responsible for inspection and log-in of incoming samples, acceptance of the samples via Chain-of-Custody and control of sample storage.

3.1.2 QA/QC Plan Distribution

The Project QA/QC Plan is distributed by the Quality Assurance Officer to both the Project Manager and Laboratory Manager.

The QA/QC Plan is then further distributed by each manager to project personnel performing key tasks in a manager's sphere of responsibility.

3.1.3 Training

All EIS personnel will be properly trained, qualified individuals. Prior to commencement of work, personnel will be given instructions specific to this project. Areas covered in this training are further delineated in the Field Sampling and Laboratory Analysis sections of this plan.

3.1.4 Document Control

Both field sampling and laboratory analysis phases of any project result in accumulation of documents such as boring logs, laboratory bench sheets, Chain-of-Custody forms and one-time documents such as Work Plans.

Document control is a formal system of activities that ensure that:

- o All participants in the project are informed of all specific documents which need to be maintained.
- o All participants in the project are promptly informed of any revisions to the Work Plan, including the QA/QC Plan.
- o All critical documents generated during the project are accounted for during and at the end of the project.

3.2 Field Sampling Activities

This section describes specific quality control activities to be followed in order to minimize and/or to detect circumstances which may adversely affect data quality for this project.

3.2.1 Evaluation of Existing Data

Any existing data pertinent to this project may be incorporated into the overall project approach. Data collected by another contractor will be validated as much as possible for adherence to quality as defined in Section 1.1.

3.2.2 Training

EIS and its subcontractor personnel working at the project site will be properly trained prior to commencement of work. Instructions specific to this project will be given in the following areas:

- o Line of authority and communication
- o Overview of the Work Plan
- o Documentation Requirements
- o Personnel Protection
- o Decontamination Procedures

3.2.3 Documentation Requirements

EIS field personnel will be required to initiate, continue and maintain the following documentation during the course of this project. Copies of these documents are enclosed as Figures 3.1, 3.2, 3.3 and 3.4.

<u>Figure</u>	<u>Document Type</u>	<u>Maintained By</u>
3.1	On-site Analyzer Calibration Log	Health & Safety Officer
3.2	Air Quality Monitoring	Health & Safety Officer
3.2	Soil Headspace Analysis	Health & Safety Officer Geologist/Engineer
3.3	Subsurface Exploration Logs	Geologist/Engineer
3.4	Chain-of-Custody	Geologist/Engineer

The documents accumulated during the project will be reviewed by the Project Manager and Quality Assurance Officer for correctness and completeness. Copies of these documents will be included in the Report of Findings for which this Work Plan is being submitted. The original documents will be archived at EIS.

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SOIL VAPOR/AMBIENT AIR FIELD ANALYSIS RECORD

PROJECT NAME _____ PROJECT NUMBER _____

LOCATION AND PURPOSE OF SURVEY _____

ANALYZER/LAMP _____ DATE _____

Site No.	Sample Type*	Sample Depth	Scale Readings Peak Steady	HNU Range	PPM **	Time	Location/Comments

* Sample Type = HP (Hole Punch) HA (Hand Auger) AA (Ambient Air)
 SS(Split-spoon) HS (Head Space - include minutes sitting i.e. HS-5)
 B (Background)

** ppm as Isobutylene unless otherwise specified
 Figure 3.2

Boring No. _____
Sheet _____ of _____
Project No. _____

Datum	Surface Elevation
-------	-------------------

After Completion _____ Hrs. _____ Ft; _____ Hrs. _____ Ft; _____ Hrs. _____ Ft; _____ Hrs. _____ Ft.

[illegible]

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CHAIN OF CUSTODY RECORD – EIS ENVIRONMENTAL ENGINEERS INC

[illegible]

FIGURE 3.4

3.2.4 Chain-of-Custody Procedures

Due to the evidentiary nature of samples collected during this response action, possession must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings.

To maintain and document sample possession, Chain-of-Custody procedures are followed. A sample is under custody if:

- o It is in your possession, or
- o It is in your view, after being in your possession, or
- o It was in your possession and then you locked it up to prevent tampering, or
- o It is in a designated secure area.

Field Custody Procedures

1. The field sampler is personally responsible for the care and custody of the samples collected until they are transferred or dispatched properly.
2. The Project Manager, or his designee determines whether proper custody procedures were followed during the field work and decides if additional samples are required.

3. Prior to commencement of sampling, the Project Manager will instruct the sampling team in the Chain-of-Custody procedures.

Transfer of Custody and Shipment

1. Samples are accompanied by a Chain-of-Custody Record (Figure 3.4) from the time they are collected. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents sample custody transfer from the sampler to the analyst at the laboratory.
2. Minimum information recorded on the Chain-of-Custody record in addition to the signatures and dates of all custodians will include:
 - o Sampling site identification
 - o Sampling date and time
 - o Identification of sample collector
 - o Sample identification
 - o Sample description (type and quantity)
 - o Analyses to be performed.

3. Samples will be stored in coolers containing ice. These coolers will be transported to the EIS laboratory in an EIS vehicle.
4. The EIS sample custodian will accept custody of the samples via the Chain-of-Custody form. At this time, the physical condition of the transported samples will be examined and recorded.

3.2.5 Field Measurement Equipment/Procedures

Photoionization analyzers (PID) will be utilized by EIS to support the soil sampling project from the following two standpoints:

- o Ambient air monitoring will be performed throughout the project to assess potential worker exposure to airborne VOC. This activity is described in Section 4, Health and Safety Plan.
- o Soil vapor concentrations of VOC will be measured using headspace techniques, in order to allow establishing a relationship between laboratory results and on-site PID readings. This relationship will be utilized should further areal soil sampling (as dictated by laboratory results) be required.

The primary PID instrument will be a HNU PI 101 with 11.7 eV lamp. The presence of 1,1,1-Trichloroethane (established by a previous survey by Weston SPER) dictates the use of the 11.7 eV instrument. Back-up on-site measurements will be performed with a TIP II (10.6 eV lamp).

The EIS SOP (Standard Operating Procedure) for these analyzers is included in Appendix B.

Instrument calibration will follow the SOP requirements with the following exceptions:

- o Many compounds both chlorinated and aromatic, were identified at the site. Many have significantly different ionization potentials and therefore responses to the PID.

In addition to the Isobutylene calibration, a Trichloroethylene standard will also be analyzed. The response of this standard to the Isobutylene curve will be used to determine Action Limits for air contaminants as discussed in the Safety and Health Section of this Plan.

This compound (Trichloroethylene) exhibits a photoionization potential somewhat higher than Benzene and lower (estimated) than 1,1-Dichloroethylene. Its use is intended to minimize excursions above the Benzene and 1,1-Dichloroethylene OSHA and/or ACGIH TLV's should these compounds be the only ones encountered.

- o Calibration checks will be increased over those normally required by the EIS PID SOP.

All PID readings as well as calibrations and calibration checks, will be documented in the forms listed in Section 3.2.3.

3.2.6 Sampling/Sample Preservation/Storage

SUBSURFACE SOIL EXTRACTION

Subsurface soil samples will be collected in accordance with the Work Plan as given in Sections 2.1.1 through 2.1.3. The subsurface sampling equipment will be decontaminated in accordance with the Work Plan as given in Section 2.1.4.

In order to verify the effectiveness of the field decontamination procedures, an Equipment Blank will be obtained each day at the end of the sampling day. This blank will consist of a deionized water rinse of the decontaminated split-spoon sampler.

SAMPLE CONTAINERS/SAMPLE COLLECTION

Volatile Organic Compounds (VOC) are the only analysis requirement for this project. Containerization of the split-spoon samples will be in duplicate 40cc Teflon septa vials. Each of these duplicate vials will be labeled with identical information using EIS sample jar labels. An example copy of a label is enclosed as Figure 3.5.

No preservatives will be used. The vials will be filled to capacity in order to eliminate as much as possible, headspace in the vials.

Each split-spoon sample will need to be used for two separate functions:

- o Field PID Breathing Air and Headspace Analysis
- o Laboratory Analysis

FIGURE 3.5

SAMPLE CONTAINER LABEL



EIS ENVIRONMENTAL ENGINEERS, INC.

1701 North Ironwood Drive • South Bend, Indiana 46635

CLIENT _____

SAMPLE NO. _____

DESIGNATION _____

ANALYSIS _____

PRESERVATIVE _____

DATE _____ BY _____

The following protocol will be followed, in as rapid a fashion as possible, to meet the sample collection objectives:

- o Immediately screen the opened spoon for safety and health evaluation.
- o Collect duplicate VOC vial samples for laboratory analysis. Vial contents for each of the duplicate vials will be composites from different sections of the spoon.
- o Fill a headspace jar for subsequent PID analysis.

Excess soil from the split-spoon and the soil headspace jar will be disposed of by placing it into Pit C.

The headspace jar will be decontaminated on-site by brushing and water rinses. The rinse water will be placed into the 55 gallon drum used for decontamination of the split-spoon. The headspace jar will be reused if PID readings are acceptable after air drying.

STORAGE

The collected VOC vials will be stored in racks inside a cooler with ice.

A Trip Blank will be present in the storage rack to monitor overall cleanliness conditions.

3.3 Laboratory Activities

This section describes specific QA/QC procedures to be followed for the Warner Baker Estate/Accra Pac soil VOC analysis project. No other laboratory aspects are covered by this QA/QC plan.

3.3.1 General

Soil sample/water sample analysis will be performed at the EIS laboratory. The specific methodology to be used is given in EPA's "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, 3rd Edition, Methods 5030 and 8240 (Purge and Trap, Gas Chromatography/Mass Spectrometry). A methanol extraction of the soil samples will precede the Purge and Trap step. The types of compounds detectable by this procedure is given in Table 3.1.

TABLE 3.1
PARTIAL LISTING - VOLATILE ORGANIC COMPOUNDS
DETECTABLE BY PROCEDURES LISTED IN TABLE 2
AND PRACTICAL QUANTITATION LIMITS (PQL)

Compound Name	Practical Quantitation Limits (PQL)			
	Water (µg/l)		Soils (ppm)	
	601 + 602	624	601 + 602	624
Acetone	10	10	0.5	0.5
Acrolein		10		0.5
Acrylonitrile		10		0.5
Benzene	1	5	0.05	0.25
Bromodichloromethane	1	5	0.05	0.25
Bromoform	1	5	0.05	0.25
Bromomethane	1	10	0.05	0.5
Carbon Disulfide		5		0.25
Carbon Tetrachloride	1	5	0.05	0.25
Chlorobenzene	1	5	0.05	0.25
Chloroethane	1	10	0.05	0.5
2-Chloroethylvinyl Ether	10	5	0.5	0.25
Chloroform	1	5	0.05	0.25
Chloromethane	1	10	0.05	0.5
Dibromochloromethane	1	5	0.05	0.25
1,2-Dibromoethane	1	5	0.05	0.25
Dibromomethane		5		0.25
1,2-Dichlorobenzene	1	5	0.05	0.25
1,3-Dichlorobenzene	1	5	0.05	0.25
1,4-Dichlorobenzene	1	5	0.05	0.25
Dichlorodifluoromethane	1	5	0.05	0.25
1,1-Dichloroethane	1	5	0.05	0.25
1,2-Dichloroethane	1	5	0.05	0.25
1,1-Dichloroethylene	1	5	0.05	0.25
c-1,2-Dichloroethylene	1	5	0.05	0.25
t-1,2-Dichloroethylene	1	5	0.05	0.25
1,2-Dichloropropane	1	5	0.05	0.25
c-1,2-Dichloropropene	1	5	0.05	0.25
t-1,2-Dichloropropene	1	5	0.05	0.25
Ethyl Benzene	1	5	0.05	0.25
2-Hexanone	10	10	0.5	0.5
Iodomethane				
Methylene Chloride	1	5	0.05	0.25
Methyl Ethyl Ketone	10	10	0.5	0.5
Methyl Isobutyl Ketone	10	10	0.5	0.5
Styrene	1	5	0.05	0.25
1,1,2,2-Tetrachloroethane	1	5	0.05	0.25
Tetrachloroethylene	1	5	0.05	0.25
Tetrahydrofuran	10	10	0.5	0.5
Toluene	1	5	0.05	0.25
1,1,1-Trichloroethane	1	5	0.05	0.25
1,1,2-Trichloroethane	1	5	0.05	0.25
Trichloroethylene	1	5	0.05	0.25
Trichlorofluoromethane	1	5	0.05	0.25
1,2,3-Trichloropropane	1	5	0.05	0.25
Vinyl Acetate	10	10	0.5	0.5
Vinyl Chloride	2	5	0.1	0.25
Xylenes	1	5	0.05	0.25

In addition, fuel type hydrocarbons such as gasoline, fuel oil and kerosene and industrial mixtures such as naphtha and thinners are also detected by these procedures.

Note: Soil PQL is on an "as received basis". Both water and soil PQL values are for CLEAN samples. PQL increases with sample matrix problems.

3.3.2 Receipt and Log-In of Samples

The soil samples (plus waters such as Trip Blanks) will be released to the laboratory by the field personnel via a Chain-of-Custody form. The EIS Laboratory Sample Custodian will, at this time, perform the following functions:

- o Verify completeness of sample labels and Chain-of-Custody forms.
- o Verify sample integrity.
- o Determine whether samples were properly refrigerated during transportation.
- o Assign a unique laboratory sample identification number. Each duplicate set of soils will have the same number.
- o Fill out a laboratory analysis request sheet.
- o Sign and date the Chain-of-Custody.
- o Place samples into the walk-in cooler for storage until analysis time.

3.3.3 Sample Storage

Samples will be stored at 4°C in the walk-in cooler until they are analyzed. Sample analysis will be completed within 14 days from sample receipt.

3.3.4 Soil Sample Extraction

A methanol extraction of the soils will be performed prior to instrumental analysis. An aliquot of this extract will then be subjected to Purge and Trap, GC/MS evaluation.

The methanol used for the extraction will also be analyzed by Purge and Trap, GC/MS and will represent the Method Blank.

Soil moisture content analysis will be initiated at this time.

3.3.5 GC/MS Analysis

Prior to each days (12 hours) instrumental analysis, the GC/MS system will be evaluated for acceptable performance according to the following protocol.

- o Analyze the tuning compound BFB. Do not proceed until acceptable mass intensities are obtained. Table 3.2 presents BFB intensity requirements.

TABLE 3.2
BFB KEY ION ABUNDANCE CRITERIA

<u>MASS</u>	<u>ION ABUNDANCE CRITERIA</u>
50	15 - 40% of Mass 95
75	30 - 60% of Mass 95
95	Base Peak, 100% relative abundance
96	5 - 9% of Mass 95
173	Less than 2% of Mass 174
174	Greater than 50% of Mass 95
175	5 - 9% of Mass 174
176	Greater than 95% but less than 101% of Mass 174

- o Analyze a multicomponent standard mixture which contains, among other things, compounds called Calibration Check Compounds (CCC) and System Performance Check Compounds (SPCC). Response factors of these compounds are to meet Initial Calibration Data Response factor criteria before analysis can proceed. Initial calibration is based on a 5 level calibration curve.
- o The multicomponent standard, in addition to CCC and SPCC compounds, will also contain, as a minimum, all compounds previously identified at the Warner Baker Estate/Accra Pac site. Response factors for these compounds must also be within acceptance criteria.

Following achievement of the above acceptance criteria, sample analysis can begin. Each sample, standard and blank will be spiked with a solution containing Internal Standards (IS) and Surrogates (SUR). The following compounds are used:

Bromochloromethane (IS)
1,4-Difluorobenzene (IS)
Chlorobenzene, d5 (IS)
1,2-Dichloroethane, d4 (SUR)
Toluene, d6 (SUR)
Bromofluorobenzene (SUR)

Recovery of the surrogate compounds must be within a QC range of 70-130% in order for the analysis to be considered acceptable. If recovery is outside these limits, the sample is reanalyzed. If the reanalysis is also outside the limits, the sample results are considered valid and surrogate recovery problems are termed "matrix problems".

In addition to BFB tuning, CCC and SPCC criteria evaluation and use of Internal Standards and Surrogates, the following additional Quality Controls will be analyzed.

<u>Control Description</u>	<u>Analysis Frequency</u>	<u>Used For</u>
Deionized Water	1/day	Preparing Standards and sample dilutions
Method Blank (Methanol + Water)	1/20 samples	Methanol Extraction of Soils
Duplicate Matrix Spike	1/20 samples	Check on matrix recoveries of compounds of interest and overall system response
Trip Blanks	1/field day	Assessing Field conditions
Equipment Blanks	1/field day	Field sampling Equipment Cleanliness

3.3.6 Documentation

All analytical results will be thoroughly documented (in ink) and will be of reproducible quality. This documentation will consist of at least the following:

- o Complete Chain-of-Custody record for the sample
- o Records of all sample preparation work, including weights used, volumes used, dilutions made
- o Traceability of chemicals used to prepare analytical standards, internal standards, surrogate compounds.
- o Documentation of manual calculations

3.3.7 Data Validation

The Quality Assurance Manager is responsible for performing data validation. The tools used in this process include at least the following:

- o Deionized water and method blanks should be reasonably low and consistent with historical values.
- o Trip blanks and field equipment blanks should be reasonably low. Trip blanks especially should be consistent with data accumulated from previous projects.
- o Daily GC/MS acceptance criteria must have been met.

- o Duplicate Matrix Spike analysis will yield both precision and accuracy data expressed in terms of % Recovery and Relative Percent Difference.

4.0 HEALTH AND SAFETY PLAN

4.1 Introduction

This health and safety plan has been designed by EIS for the conduct of work at the Warner Baker/Accra Pac, Industrial Parkway site. Work activities will involve bore hole drilling and subsurface soil and groundwater sampling. This plan follows requirements of the OSHA Labor Standard for Hazardous Waste Operations and Emergency Response (29 CFR 1910.120) as they apply specifically to this project, based upon previously observed conditions at the site. In addition, requirements of the OSHA Labor Standard for General Industry (29 CFR 1900-1910) and the OSHA Construction Standard (29 CFR 1926) will be followed, when applicable, during this project. The EIS Project Manager and project staff, particularly the Health and Safety Officer, will be responsible for continuous adherence to the safety procedures during site work at the former Accra Pac site. In no case may work be performed in a manner that conflicts with the intent of or the safety concerns expressed in this program. Personnel violating safety procedures will be removed from the job.

4.2 Program Organization and Administration

The Health and Safety Officer will coordinate his efforts with the EIS Project Manager. It is the Health and Safety

Officer's responsibility to perform the air-quality monitoring. The Health and Safety Officer will supervise day-to day execution of the personnel protection program and prohibit improperly prepared personnel from entering or working in site areas designed as contaminated zones. Training, reporting findings, and interaction with project personnel for Health and Safety matters are also duties of the Health and Safety Officer.

4.3 Hazard Assessment

4.3.1 Initial

A study of conditions at the site has been made to evaluate the potential hazards to members of the field team during the boring and sampling. This evaluation was based on the following.

- o Nature of the contaminants.
- o Locations of the contaminants at the site.
- o Levels of contaminants at the site.
- o Potential for worker exposure during the various site activities.
- o Effects of the contaminants on human health.

The initial hazard assessment is based primarily on findings generated by a study conducted by the EPA Technical Assistance Team (TAT). Their report (TAT-05-G2-00088) showed the presence of numerous Volatile Organic Compounds (VOC) in soil as determined by laboratory analysis. The report also addressed airborne VOC levels as measured by a HNU Photoionization Analyzer (PID).

No information was presented in the report as to the eV rating of the UV lamp inside the PID. EIS is therefore proceeding on the assumption that airborne VOC concentrations shown in the report are the minimum values which might be present.

Table 4.1 presents soil VOC levels found in various areas of the site and PID readings addressed in the TAT report. Table 4.2 presents exposure limit guidelines for airborne contaminants.

Since these compounds were found in the soil in high concentrations, inhalation or skin contact may occur during drilling and subsurface investigations. Precautions are outlined in this plan which will minimize exposure to these compounds.

TABLE 4.1
SOIL VOC CONTAMINANTS
AIRBORNE VOC CONCENTRATIONS
EPA TAT REPORT

<u>Compound Name</u>	<u>Soil Concentration (ppm)*</u>		
	<u>Pit A</u>	<u>Pit B</u>	<u>Pit C</u>
Acetone	13	51	31
Benzene			4
Ethyl Benzene		30-97	690-700
1,1-Dichloroethane	0.3		11
1,1-Dichloroethylene			6-19
1,2-Dichloroethane			110
t-1,2-Dichloroethylene			20
Methylene Chloride			11
Tetrachloroethylene	34		1.7
1,1,1-Trichloroethane	13	3.4-11	2700-28000
Trichlorofluoromethane			1115
Toluene		4.6-20	1600-2000
Xylenes		430-712	1880-2100
PID Ambient Air Readings	1-4	>50	>200

* Same soil analysis for Pits B and C by two different laboratories yielded the ranges shown. If no range is shown, then only one of the laboratories reported a result.

TABLE 4.2
EXPOSURE GUIDELINES

<u>Compound</u>	<u>OSHA PEL¹ ppm</u>	<u>ACGIH TLV² ppm</u>	<u>ACGIH STEL³ ppm</u>
Acetone	1000	750	1000
Benzene	10	10	25
Ethyl Benzene	100	100	125
1,1-Dichloroethane	100	200	250
1,1-Dichloroethylene		5	20
1,2-Dichloroethane	-	10	-
t-1,2-Dichloroethylene	200	200	250
Methylene Chloride	500	100	500
Tetrachloroethylene	100	50	200
1,1,1-Trichloroethane	350	350	450
Trichloroflouromethane	-	1000 (ceiling)	-
Toluene	200	100	150
Xylenes (o,m,p-isomers)	100	100	150

1 Taken from 29 CFR 1910.1000, July, 1987

2 Taken from "Threshold" Limit Values for Chemical Substances in the Work Environment", American Conference of Governmental Industrial Hygienists (ACGIH), 1986

3 Short Term Exposure Limit - a 15 minute weighted average which should not exceed at any time during the work day except for short periods of time

4.3.2 Continuing Hazard Assessment On-Site

Portable instruments will be used to provide semiquantitative data on VOC concentrations in and around the breathing zone of workers. A HNU PI 101 photoionization detector (PID) with an 11.7 eV lamp will be used for this purpose. A TIP II PID with a 10.6 eV lamp will serve as a back-up.

A Gastech GX-8 Explosimeter will be used to determine % LEL during boring.

Air sampling will be conducted by taking and recording periodic readings (approximately every 30 minutes) at each of the following locations.

- o In the breathing zone, near the opening of each bore hole being drilled.
- o In the breathing zone over freshly-exposed soil being excavated.

In addition, each split-spoon sample will be screened immediately upon opening the spoon. Sample collection from the spoon will be performed according to the Health and Safety Officers instructions. Periodic readings of background levels (and thus knowledge of

where background is in relationship to the work area) will be made. Reading frequency may be increased at the discretion of the Health and Safety Officer.

Action Limits

The term Action Limits defines predetermined airborne concentrations which will dictate certain responses by the Health and Safety Officer in order to minimize worker exposure.

The Action Limits shown in Table 4.3 were developed from the data shown in Tables 4.1 and 4.2.

Specifically, the limits are based on the following:

- o A HNU PI 101 analyzer employing a 11.7 eV lamp will be used to measure concentrations. The presence of certain chlorinated solvents with high photoionization potentials (such as 1,1,1-Trichloroethane) dictate the eV rating.
- o Irrespective of individual compound concentrations in the soil, the presence of 1,1-Dichloroethylene dictates that its "allowable exposure limit" be used to establish the Action Limits.

Worker exposure protection must consider the fact that this compound could be present by itself and therefore be responsible for the total reading observed by the PID.

TABLE 4.3
ACTION LIMITS FOR AIR CONTAMINANTS
EXPRESSED AS TRICHLOROETHYLENE

<u>Action Limit</u>	<u>Persistent (>15 Minutes) Concentration in the Breathing Zone*</u>	<u>Action To Be Taken</u>
Lower	5	. Don Level C Protection . Increase Monitoring Frequency
Upper	50	. Don Level B Protection . Increase monitoring Frequency . Increase Visual Stress Observations

* For workers with either Level C or Level B Protection, the Breathing Zone is outside of the protective equipment with respect to PID measurements.

- o Significant sensitivity differences (to the PID) exist for the various VOC expected to be present. Although the PID will be calibrated per EIS Standard Operating Procedure (SOP)(see Appendix B), the Action Limit concentrations will be based on the response of a Trichloroethylene standard to the calibration curve.

This compound (Trichloroethylene) has been chosen since its photoionization potential is closer to that of 1,1-Dichloroethylene than would be the calibration gas compound (Isobutylene).

Response Actions

At grade level when the PID yields persistent readings at the LOWER action limit, workers in the affected area will be instructed by the Health and Safety Officer to don Level C protective equipment. Persistent readings will be defined as 15 minutes or more at the lower action limit.

Workers who don Level C protective equipment will be afforded a 10 fold Protection Factor. These workers will be allowed to continue their assigned tasks until one of the following occurs:

- o The PID yields persistent readings (15 minutes or more) at the UPPER action limit.

The Health and Safety Officer will, at this time, issue either of the following directives:

- Workers in the affected area must don Level B protective equipment
- Workers are to leave the affected area until levels subside.

- o The PID levels subside below the LOWER action limit (and remain there for 5 minutes).

The Health and Safety officer will allow discontinuance of Level C protection.

Workers who don Level B protective equipment will be allowed to continue work based on heat and exertion factors. It will be the Health and Safety Officer's responsibility to monitor (visually) all Level B workers.

At below grade level initial entry shall be permitted only to workers equipped with Level B protection. If levels of potentially hazardous air contaminants based

on PID readings are below the UPPER action limit personal protective equipment may be down graded to level C at the discretion of the Health and Safety Officer. Air monitoring will continue for the duration of the work and the decision to return to Level B protection will be made on the basis of PID readings (UPPER Action Limit).

No below grade work will be allowed for workers equipped only with Level D protective equipment.

4.4 Personal Protective Equipment

Personnel involved in drilling of boreholes and collection of samples will be working in close proximity to each other. Potential for exposure to contaminated air should not differ significantly based on activity. Therefore levels of protection will be determined by airborne concentrations.

The personnel protection program for the project includes employee health considerations, specifications for protective equipment, procedures for training of employees, and decontamination procedures. Listed below is the protective equipment to be utilized in this project. The type of

protective equipment to be used in specific situations will be based on the action limits specified in Table 4.3. Levels of potentially hazardous air contaminants will be determined utilizing PID readings.

Level B Protection

- Supplied-air respirators (OSHA/NIOSH approved)
- Chemical-air resistant clothing
- Chemical-resistant outer gloves
- Chemical-resistant outer boots, steel toe and shank

Level C Protection

- Air-purifying respirator, half or full-mask, canister equipped, (OSHA/NIOSH approved)
- Chemical-resistant clothing
- Chemical-resistant outer gloves
- Chemical-resistant outer boots, steel toe and shank

Level D Protection

- Coveralls
- Safety Boots or Shoes
- Safety Glasses or Goggles
- Hard Hat
- Gloves

4.5 Health Status

All on-site workers are required to be in good health and to have exhibited the ability to use respiratory protection. Beards and facial hair inhibit the proper seal of a respirator. No personnel with facial hair will be permitted in areas requiring respiratory protection.

All on-site personnel will undergo a baseline medical examination by a qualified occupational health physician prior to site entry. Personnel who have undergone the examination within the past year will not need re-examination. Each on-site worker will be required to have a follow-up examination within one year of the baseline examination, to detect any changes in health status. This medical surveillance program follows the recommendations outlined in "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" and is in accordance with 29 CFR 1910.120.

If it is determined that an employee has a medical condition which could directly or indirectly be aggravated by exposure to organic compounds within the site environment, or is unable to use respiratory protection, this employee will not be permitted on-site.

All visitors to the site, regardless of their affiliation will be required to show that they have undergone a medical examination and proof of fitness to wear a respirator before being allowed to don respiratory protection.

All visitors will comply with the requirements of this Health and Safety Plan while on the work site. They will be required to sign a Site Log In Sheet to indicate that they have read, and will comply with, the site health and safety requirements.

Any employee who develops a lost time illness or injury will notify the health and safety officer, file an injury/illness report form and will be re-examined by a physician. The physician must certify that the employee is fit to return to work before employment on-site can continue. In addition, the Health and Safety Officer can request additional medical testing if an abnormal site exposure occurs. A statement of the employee's health will be maintained by the EIS Health and Safety Officer.

4.6 Health and Safety Training

The Health and Safety Officer will train all project personnel prior to their working on site. Training will include:

- o Requirements for employees to have received the baseline medical examination within one year of on-site work

- o Requirements for and use of respirators and personal protection equipment
- o Cautions regarding the potential for trench collapse
- o Required personal hygiene practices
- o Requirements for employees to work in pairs
- o Proper material handling
- o Maintenance of safety equipment
- o Effective response to any emergency
- o Responses to fires and explosions
- o Emergency procedures (e.g., in the event of a trench collapse)
- o Hazard zones
- o Decontamination methods
- o General safety precautions

A copy of the Standard Safety Procedures (Table 4.4) will be given to each worker.

Training will be documented by the Health and Safety Officer.

All personnel entering the site, regardless of affiliation, will read the Health and Safety Plan and sign a statement to the effect that he/she read the plan and will comply with all requirements of the Plan.

4.7 Decontamination

Administrative procedures require hygienic practices consistent with work hazards. Employees will be instructed in the training program on proper personal hygiene procedures.

Contaminated sampling equipment will be decontaminated prior to leaving the site. The decontamination procedure will be consistent and with procedures outlined in EPA's Occupational Health and Safety Manual for Hazardous Waste Site Activities. Minimum decontamination procedure will be as follows:

- o Wash with water to remove gross contamination
- o Rinse with distilled water

Contaminated materials (water, Tyvek coveralls, disposable gloves, etc.) will be placed in 55-gallon drums and stored on site while arrangements are made for disposal. Rinse water from equipment decontamination may be allowed to evaporate from drip-collection pans in an open area.

Contaminated soil will be brushed off all heavy equipment and drill rigs prior demobilization.

Respirators, if used, will be cleaned and disinfected after each day of use. The facepiece (with cartridge removed) will be washed in a hypochlorite (or equivalent) disinfecting solution, rinsed in warm water and air dried in a clean place.

TABLE 4.4

STANDARD SAFETY PROCEDURES

ACCRA PAC

- o Employees are required to have a baseline medical examination within one year of on-site activity.
- o Employees are required to work in pairs.
- o Wash face and hands prior to eating, smoking, or leaving the site.
- o No smoking or eating is allowed in the work area during active drilling, excavation or sampling activities.
- o Wearing of contact lenses is not permitted in the work area.
- o Contaminated material (e. g., Tyvek coveralls) must be properly disposed of before leaving the site. Disposal is to be in specially provided 55 gallon drum.

4.8 Emergency Procedures

The Health and Safety Program for the former Accra Pac Industrial Parkway site operations has been based to allow site operations to be conducted without adverse impacts on worker health and safety. In addition, supplementary emergency response procedures have been developed to cover extraordinary conditions at the site.

4.8.1 General

All accidents and unusual events will be dealt with in a manner to minimize a continued health risk to site workers. In the event that an accident or other unusual event occurs, the following procedure will be followed:

- o First aid or other appropriate initial action will be administered by those closest to the accident/event. This assistance will be conducted so that those rendering assistance are not placed in a situation of unacceptable risk. In the event that a worker is caught in a trench collapse, call for emergency assistance immediately.

- o All accidents/unusual events must be reported to the EIS Health and Safety Officer and the EIS Project Manager. The Health and Safety Officer is responsible for conducting the emergency response in an efficient, rapid, and safe manner. The Health and Safety Officer or the designated supervisor will decide if off-site assistance and/or medical treatment is required and arrange for assistance.
- o All workers on site should conduct themselves in a mature, calm manner in the event of an accident/unusual event, to avoid spreading the danger to themselves and surrounding workers.

The following emergency equipment will be available in the area:

- o First-aid kit
- o Fire extinguisher and blanket
- o Stretcher
- o Emergency eye-wash station (squeeze bottle-type)
- o Self-contained breathing apparatus

The Health and Safety Officer will have the emergency equipment.

4.8.2 Response to Specific Situations

Emergency procedures for specific situations are given in the following paragraphs.

Worker Injury

If an employee in a contaminated area is physically injured, Red Cross first-aid procedures will be followed. Depending on the severity of the injury, emergency medical response may be sought. If an excavation collapses and a worker is caught, call for emergency assistance immediately. If the person is in no immediate danger, do not attempt to move him.

Internal injuries could be worsened. If the employee can be moved, he will be taken to the edge of the work area (on a stretcher, if needed) where contaminated clothing (if any) will be removed, emergency first-aid administered, and transportation to a local emergency medical facility awaited.

If the injury to the worker is chemical in nature (e.e., overexposure), the following first-aid procedures are to be instituted:

- o Eye Exposure - If contaminated solids or liquids get into the eyes, wash eyes immediately at the emergency eye-wash station using large amounts of water and lifting the lower and upper lid occasionally. Obtain medical attention immediately.
- o Skin Exposure - If contaminated solids or liquids get on the skin, promptly wash the contaminated skin using soap or mild detergent and water. Obtain medical attention immediately when exposed to concentrated solids or liquids.
- o Inhalation - If a person inhales large amounts of toxic vapor, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Obtain medical attention as soon as possible.
- o Swallowing - When contaminated solids or liquids have been swallowed, the Poison Control Center will be contracted and their recommended procedures followed.

4.8.3 Notification

Checklist

The names and phone number of all personnel and agencies that could be involved in emergency responses have been determined. The list will be posted at several prominent locations at the site. Table 4.5 provides the notification checklist for use at the former Accra Pac Industrial Parkway site.

Documentation

The Health and Safety Officer will provide a report to the EIS Project Manager and Health and Safety Officer containing the following information regarding any incidents implicating health and safety concerns:

- o The event (including date and time) that necessitated the notification and the basis for that decision.
- o Date, time and names of all persons/agencies notified and their response.

TABLE 4.5
NOTIFICATION LIST
WARNER BAKER/ACCRA PAC SITE

In the event of an extraordinary event that might be damaging to personnel or adjacent property, immediate notification to the proper emergency service will be required. The proper emergency service is determined by the nature of the emergency. The nearest telephone is located in the plant lobby.

EMERGENCY NOTIFICATION

Elkhart Fire Department.....	219-295-7350
Elkhart Ambulance.....	219-295-7350
Elkhart Police Department.....	219-295-7070
Elkhart General Hospital.....	219-294-2621
Poison Control Center.....	800-392-9097
EPA Project Coordinator.....	312-886-1959

After notification of the proper emergency service or services, proceed to deal with the emergency at hand.

Procedure for Reporting Incidents:

Immediately call: H. Stephen Nye (EIS).....219-277-5715
(Home).....219-233-4099

Subsequently contact (in case of an emergency situation)

Andris Rozite (Home).....219-287-0670
David M. Nye (Home).....219-291-4088

- o Resolution of the incident (including duration) and the method/corrective action

This report will be submitted within five working days of the resolution of the event.

4.8.4 Evacuation Plan

Although very unlikely, it is possible that a site emergency could necessitate evacuating all personnel from the site. If such a situation arises, both the Health and Safety Officer and Project Manager will be notified of the event and the appropriate signal given for site evacuation. It is the responsibility of these individuals to evacuate personnel in a calm, controlled fashion.

All available vehicles will be used in the evacuation. All personnel will exit the site and be taken to a rendezvous point which will be selected by the Health and Safety Officer depending on wind direction, severity and type of incident, etc. Local authorities will be notified of the evacuation.

The Project Manager's log of on-site personnel (Field Notebook) will be used to account for all individuals. If someone is missing, the Health and Safety Officer will alert emergency personnel. Control of personnel at the rendezvous point is the responsibility of the Project Manager or designated assistant.

5.0 PROJECT SCHEDULE

Begin Field Investigation	April 10, 1989
Complete Field Investigation	May 31, 1989
Complete Laboratory Analysis	July 1, 1989
Complete Preliminary Report	July 19, 1989
Complete Final Report	August 1, 1989

APPENDIX A

WESTON INTERIM REPORT

JUNE 25, 1987



River Center, 111 North Canal Street, 8th Floor, Suite 855,
Chicago, IL 60606 • (312) 993-1067

TECHNICAL ASSISTANCE TEAM FOR EMERGENCY RESPONSE REMOVAL AND PREVENTION
EPA CONTRACT 68-01-7367

Mr. Michael Strimbu
Deputy Project Officer
Emergency Response Section
Western Response Unit
U.S. Environmental Protection Agency
11th Floor
230 South Dearborn Street
Chicago, Illinois 60604

June 25, 1987

TAT-05-G2-00088

Re: Accra Pac PRP Removal Monitoring
Elkhart, Indiana
TDD# 5-8702-15

Dear Mr. Strimbu:

The U.S. Environmental Protection Agency (U.S. EPA) on February 1, 1987, tasked the Technical Assistance Team (TAT) to monitor the Potential Responsible Party (PRP) removal actions at the former Accra Pac site located at 2600 Industrial Parkway, Elkhart, Indiana (Figure 1). The site is currently owned by the estate of Warner Baker and the estate has undertaken the responsibility of the clean up actions. This interim report provides a brief site history and documents clean up procedures to date.

The site, formerly operated as an aerosol packing plant, has sat idle since January, 1976, when an explosion leveled the facility and released solvents and pesticides stored in surface tanks (U.S. Geological Survey, Water Resources Investigations 81-53). At the time of the explosion, no containment procedures for fluid run off were instituted, nor were any clean up measures enacted. Warner Baker bought the property in January, 1977, for the purpose of redeveloping the site for industrial use. The site, at the time of the transaction, was comprised of a cement slab and thirteen underground storage tanks on a parcel of land approximately 400 feet by 400 feet.

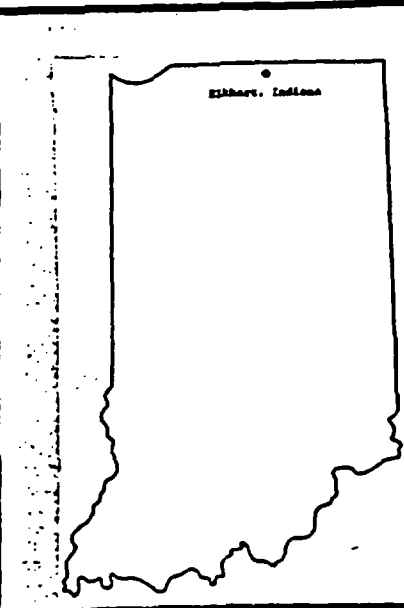
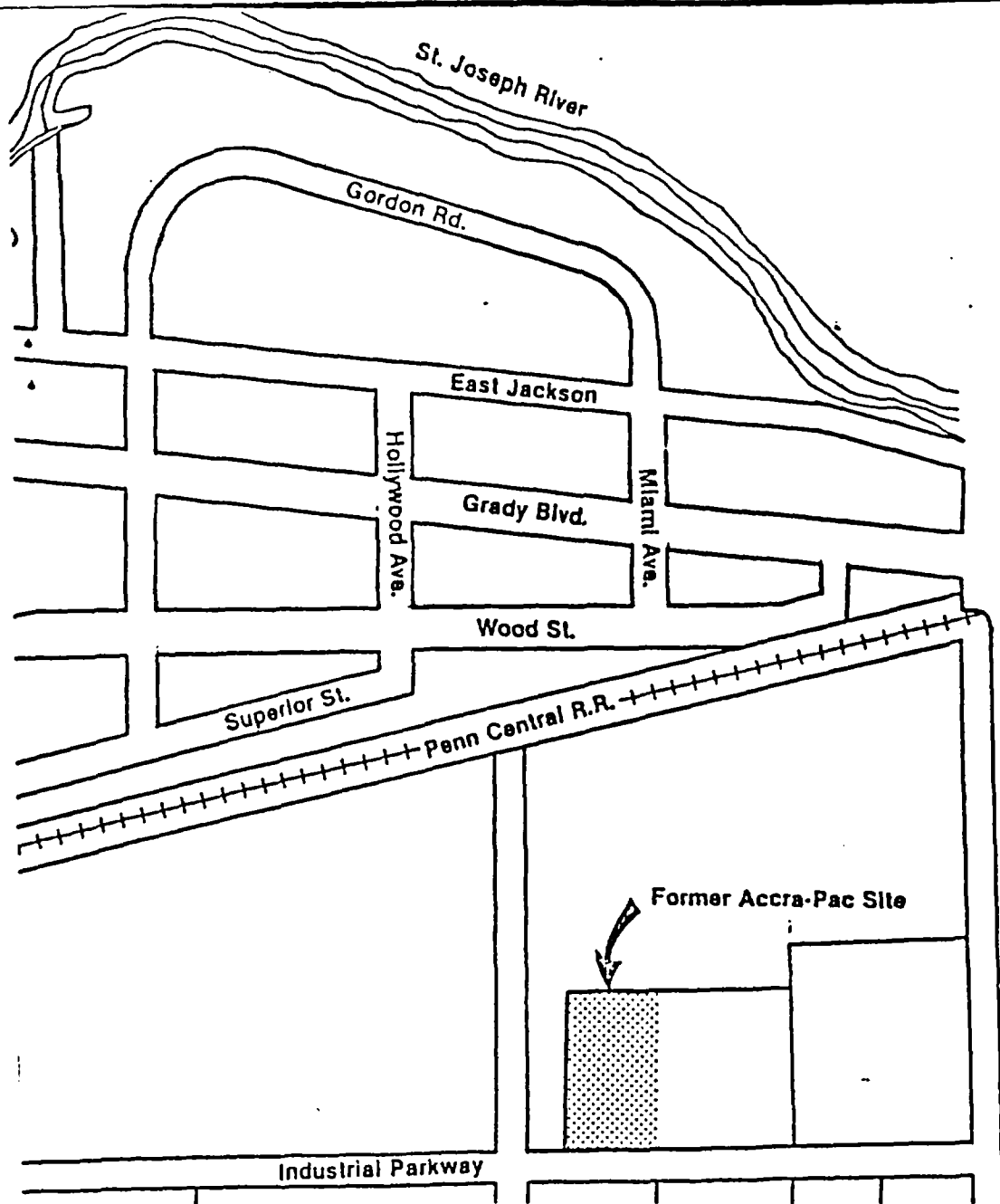
Residential water wells northwest of the site were found in May, 1985, to contain elevated levels of trichloroethylene (TCE). This area of contamination, referred to as the East Jackson area, consists of one or more contamination plumes. The affected area was large enough to warrant the extension of water mains to connect the individual residences to the Elkhart water supply.

In a subsequent, unrelated action in August, 1985, the U.S. EPA tasked the TAT to assess the threats to public health and the environment posed by the thirteen underground storage tanks at the former Accra Pac site. The close proximity of the site to the East Jackson area led the U.S. EPA On-Scene Coordinator (OSC)

Roy F. Weston, Inc.


SPILL PREVENTION & EMERGENCY RESPONSE DIVISION

In Association with ICF Technology Inc., C.C. Johnson & Associates, Inc., Resource Applications, Inc.,
Geo/Resource Consultants, Inc., and Environmental Toxicology International, Inc.




NO SCALE

FIGURE 1



SITE LOCATION MAP

ROY F. WESTON, INC.		
		
ENVIRONMENTAL CONSULTANTS-DESIGNERS		
DRAWN	DATE	PCS
RGF	061587	1025
APPROVED		TDD #
SAT	6/15/87	5.8702.15

Mr. Michael Strimbu

-2-

June 25, 1987

to suspect the site as a possible contributor to the East Jackson contamination. The site assessment identified the soils adjacent to the tanks as being contaminated based on visual staining and monitored total organic vapor levels in excess of 100 ppm. The soil samples and fluid samples from the tanks collected by the TAT indicated the presence of volatile organic compounds (VOCs). The confirmation of the contamination prompted the U.S. EPA to issue a consent order which was signed by Warner Baker. The consent order entailed the removal, transportation, and disposal of the tank contents; the decontamination and destruction of the tanks; sampling of the soil and water; installation of ground water monitoring wells; and, if warranted, removal of contaminated soils.

The initial task of the removal action was to transfer the fluids from the underground storage tanks to tanker transports for shipment to Liquid Waste Disposal (LWD), Calvert City, Kentucky, for disposal. Approximately 33,500 gallons were shipped to LWD. Copies of the hazardous waste manifests are included in this report (Attachment A).

The tank excavation commenced December 8, 1986, in the area containing tanks T-101 - T-107 (Figure 2). Contaminated soil was encountered while exhuming T-106 and T-107 at a depth of approximately 9 feet. This depth also marked the top of the saturated zone. The contamination, measured with an HNU Systems Photoionization Analyzer (HNU) registered between 1 and 4 ppm. The contaminated fill material remained in the excavation pit to ensure containment. As the remaining tanks were removed from the pit, a thin veneer of soil was spread atop the contaminated soils to minimize release of VOCs. The pit created by the removal of these tanks is Pit A.

The loading docks present at the site served as holding areas and decontamination pads for the exhumed tanks. The adverse seasonal weather conditions prevented the contractor from decontaminating and scrapping the tanks. The TAT scanned the tanks staged in the loading dock and recorded organic vapor levels of 4 ppm - 12 ppm emanating from the attached soils. Tanks T-110 - T-113 were contained in Pit B on the southwest portion of the site. The fill material in Pit B, a dark sandy soil with a high organic content, differed from the light-colored clean sands found in Pit A. The fill in Pit B also exhibited evidence of staining and emitted organic vapors with levels exceeding 50 ppm.

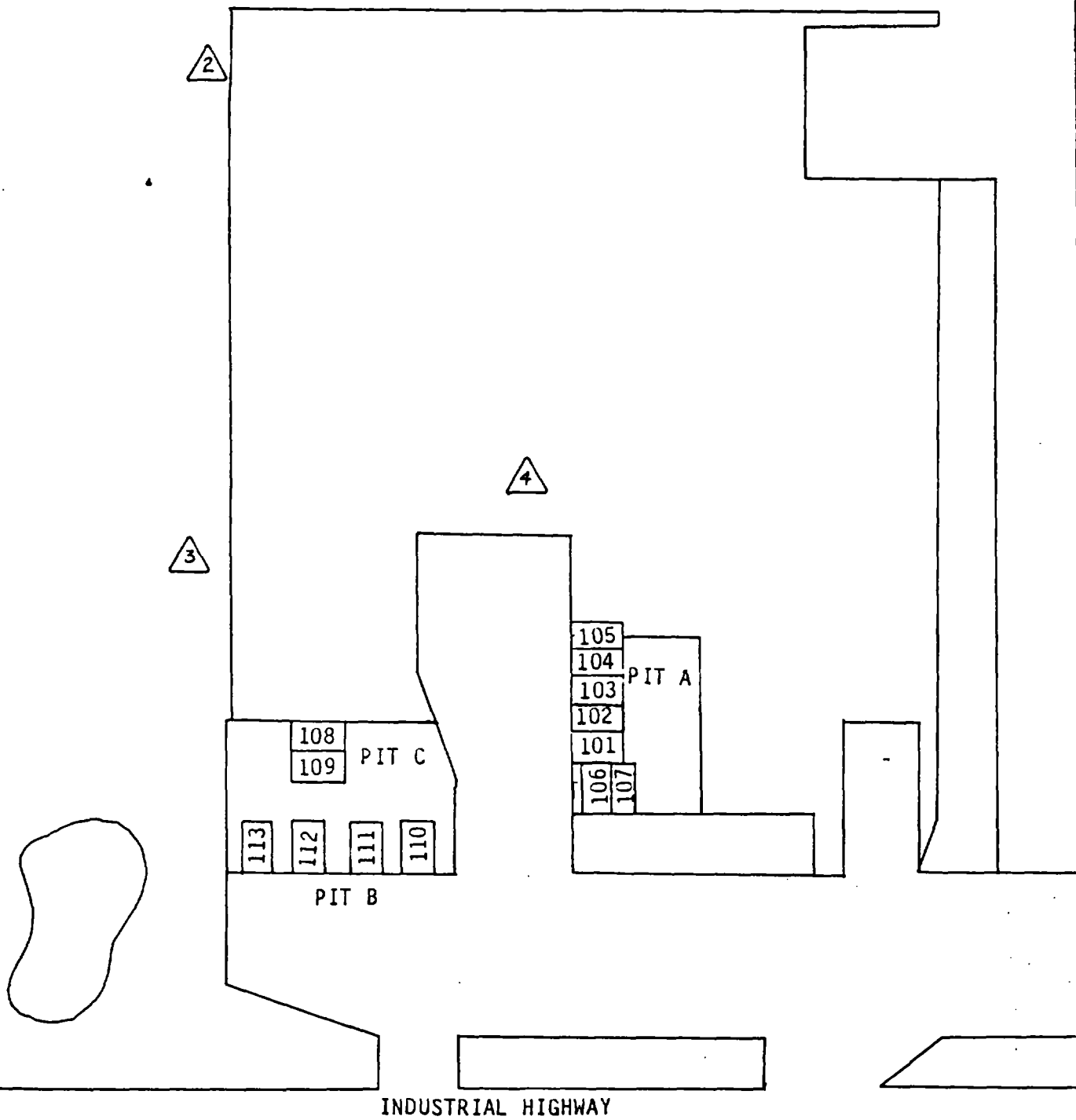


FIGURE 2
SITE MAP
FORMER ACCRA PAC SITE
ELKHART, INDIANA
Not to scale.



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Pit C, the area that contained T-108 and T-109 had fill material similar to Pit B, however, the vapor readings exceeded 200 ppm. The soil was also noticeably moist and appeared to have a higher degree of staining.

A sampling program at the former Accra Pac site was administered in multiple phases. The first phase consisted of soil and water samples from Pits A, B, and C, and the soil piles created by unearthing the tanks. Although the PRP secured their own laboratory for analysis, the TAT analyzed selected split samples for quality assurance/quality control (QA/QC) purposes under TAT Special Project TDD# 5-8612-S5. The PRP analytical results are briefly summarized below and are followed by the TAT sample splits.

PRP Soil Samples

Pit A: - Tetrachloroethylene (PCE)	-	33,780 ppb
- 1,1,1-Trichloroethane (1,1,1-TCA)	-	12,520 ppb
- 1,1-Dichloroethane (1,1-DCA)	-	310 ppb
- Acetone	-	12,740 ppb
 Pit B: - 1,1,1-TCA	-	10,510 ppb
- Toluene	-	19,990 ppb
- Acetone	-	50,780 ppb
- Ethylbenzene	-	97,400 ppb
- Xylenes	-	712,300 ppb
 Pit C: - PCE	-	1,660 ppb
- 1,1,1-TCA	-	27,879,000 ppb
- 1,1-DCE	-	5,690 ppb
- 1,1-DCA	-	10,500 ppb
- Acetone	-	30,940 ppb
- Toluene	-	1,612,700 ppb
- Ethylbenzene	-	695,800 ppb
- Xylenes	-	1,876,800 ppb
- Trichlorofluoromethane	-	1,115,400 ppb
- Benzene	-	4,150 ppb

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PRP Water Samples

Pit A: - PCE	-	236	ppb
- 1,1,1-TCA	-	19,181	ppb
- 1,1-DCE	-	580	ppb
- t-1,2-DCE	-	1,716	ppb
- 1,1-DCA	-	4,684	ppb
- Methylene chloride	-	465	ppb
- Trichlorofluoromethane	-	4,731	ppb
- Trichloroethene	-	37	ppb

Pit B: - 1,1,1-TCA	-	385	ppb
- Toluene	-	1,335	ppb
- Xylenes	-	11,280	ppb
- Ethylbenzene	-	365	ppb
- 1,1-DCA	-	50	ppb

Pit C: - 1,1,1-TCA	-	307,400	ppb
- 1,1-DCA	-	3,800	ppb
- Toluene	-	101,700	ppb
- Ethylbenzene	-	11,400	ppb
- Xylenes	-	44,350	ppb
- Benzene	-	600	ppb
- Chlorobenzene	-	500	ppb
- Trichlorofluoromethane	-	42,650	ppb

TAT Soil Samples

Pit B: 1,1,1-TCA	-	3,400	ppb
- Toluene	-	4,600	ppb
- Ethylbenzene	-	30,000	ppb
- Total Xylenes	-	430,000	ppb

Pit C: 1,1,1-TCA	-	2,700,000	ppb
- 1,1-DCE	-	19,000	ppb
- t-1,2-DCE	-	20,000	ppb
- 1,2-DCA	-	110,000	ppb
- Toluene	-	2,000,000	ppb
- Ethylbenzene	-	700,000	ppb
- Total Xylenes	-	2,100,000	ppb
- Methylene Chloride	-	11,000	ppb

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TAT Water Samples

Pit C:	1,1,1-TCA	-	130,000 ppb
	1,1-DCE	-	600 ppb
	1,1-DCA	-	2,700 ppb
	Acetone	-	2,400 ppb
	Toluene	-	81,000 ppb
	Ethylbenzene	-	7,800 ppb
	Total Xylenes	-	31,000 ppb
	Benzene	-	600 ppb
	Methylene Chloride	-	1,200 ppb

The high degree of contamination in the water samples from Pits A, B, and C, necessitated further evaluation of the shallow ground water aquifer. Ground water monitoring wells were installed the week of January 5, 1987. Constructed of stainless steel casing, the wells were developed and sampled immediately following completion of drilling. The samples were analyzed by Gulf Coast Labs. The analytical results from the wells are listed below.

Monitor Well No. 1:

	1,1,1-TCA	-	400 ppb
	1,1-DCA	-	230 ppb

Monitor Well No. 2:

	PCE	-	90 ppb
	1,1,1-TCA	-	3,700 ppb
	1,1-DCA	-	810 ppb
	Trichlorofluoromethane	-	150 ppb
	t-1,2-DCE	-	110 ppb
	Dichlorofluoromethane	-	130 ppb

Monitor Well No. 3:

	PCE	-	5.5 ppb
	1,1,1-TCA	-	5,200 ppb
	1,1-DCA	-	1,550 ppb
	1,1-DCE	-	60 ppb
	Trichlorofluoromethane	-	260 ppb
	t-1,2-DCE	-	300 ppb
	Dichlorofluoromethane	-	260 ppb

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Monitor Well No. 4:

PCE	-	60 ppb
1,1,1-TCA	-	9,700 ppb
1,1-DCA	-	1,500 ppb
Total Xylenes	-	680 ppb
Toluene	-	470 ppb
1,1-DCE	-	90 ppb
Ethylbenzene	-	90 ppb
Trichlorofluoromethane	-	320 ppb
t-1,2-DCE	-	850 ppb
Dichlorofluoromethane	-	210 ppb

The flow direction of the ground water is north-northwest according to the U.S. Geological Survey. MW #4, MW #3, and MW #2 are then in a downgradient position relative to the site.

The third and final sampling phase was conducted by the U.S. EPA and entailed the sampling of 3 residences north-northwest of the site in the East Jackson Street area. The samples were analyzed by Gulf Coast Labs under TAT Special Project TDD# 5-8701-L2. Two of the homes had detectable levels of VOCs and the analytical results are listed below.

██████████:

TCE	-	59 ppb
1,1,1-TCA	-	110 ppb
1,1-DCA	-	9 ppb
1,1-DCE	-	6 ppb
Trichlorofluoromethane	-	55 ppb
Dichlorofluoromethane	-	4.5 ppb

██████████:

1,1,1-TCA	-	1,100 ppb
1,1-DCA	-	250 ppb
1,1-DCE	-	86 ppb
Trichlorofluoromethane	-	230 ppb
Dichlorofluoromethane	-	97 ppb

The contractor began tank scrapping activities during the first week of April. The tanks, which had been secured by chainlink fences, were removed from the loading docks and the remaining fluids and sludges pumped into 55-gallon drums. The tanks were deconned, cut into pieces, and transported to a scrap facility.

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The work that remains to be completed at the former Accra Pac site is the following:

- o Disposal of drummed sludges and removal and decontamination of conduit;
- o Determine disposal parameters for the contaminated soils;
- o Complete the site survey;
- o Determine the extent of soil contamination; and,
- o Select a disposal/treatment option to conclude the remediation of the site.

There is no work schedule at the present time to complete these tasks, nor is there any indication from the PRP that these tasks will be completed in the near future.

The analytical data and the hydrogeological data allow the following conclusions to be drawn:

- o The high degree of soil and ground water contamination resulted either from the underground storage tanks or the uncontained fluids released at the time of the explosion from above ground storage tanks;
- o The downgradient monitoring wells confirm the contamination of the aquifer and that the contamination is leaving the site;
- o The minor levels of contamination in the upgradient monitoring well could be attributed to the uncontained runoff from the explosion and the fact that a business concern, upgradient from the site and the monitoring well, operates a small water well which would have a slight impact on the ground water flow at the well location;
- o A total of six volatile organic compounds were found in the soils and waters in Pits A, B, and C, the three downgradient monitor wells, and in the two residences in the East Jackson contamination area; and,

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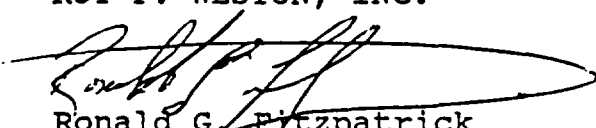
- o The presence of trichlorofluoromethane and dichlorofluoromethane, common constituents in aerosol cans, in the soils of Pit C, the ground water from Pit A and C, the ground water from monitor wells 2, 3, and 4, and in the two private well water samples in the East Jackson area indicates a unique signature contaminant. These two compounds also document the movement of contaminants from the former Accra Pac site to the East Jackson area.

This interim report has documented the PRP cleanup to date and provided an interpretation of the analytical data with respect to the hydrogeology.

Should you have any questions or require additional information, please feel free to contact us.

Very truly yours,

ROY F. WESTON, INC.



Ronald G. Fitzpatrick
Hydrogeologist

Sally Hutz
FOR Scott D. Springer
Technical Assistance Team
Leader, Region V

RGF/ljs

APPENDIX B

**EIS STANDARD OPERATING PROCEDURES
FOR FIELD PID ANALYZERS**

EIS ENVIRONMENTAL ENGINEERS, INC.
STANDARD OPERATING PROCEDURES
o TIP II PHOTOIONIZATION ANALYZER
o HNU PI 101 PHOTOIONIZATION ANALYZER

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) describes calibration and field operating procedures for both the Tip II and HNU analyzers. These instruments are, in many ways, similar and certain sections of this manual will reference both analyzers.

2.0 GENERAL COMMENTS ON OPERATING PRINCIPALS

Both analyzers measure "photoionizable" compounds present in air. The concentration of these compounds is the sum total of their responses expressed in terms of a calibration standard.

No information specific to any compound is possible except in certain unusual situations. We measure only the total contaminant load.

Instrumental response to air contaminants is based on the following factors:

- o The type of UV lamp used (its eV rating)
- o The span or range settings used
- o The calibration gas used

All of the factors above are recorded on field sheets used to calibrate the instruments.

The following brief comments address certain items which the user of these instruments is required to know.

Compounds Detectable by The Instruments

The ability of a compound to respond (give a reading) is based entirely on its photoionization potential. The eV rating of the UV lamps inside the analyzers then determines whether or not that analyzer can measure (detect) these compounds.

RULE: The Photoionization Potential of a compound must be equal to or less than (\leq) the eV rating of the UV lamp.

A listing of Photoionization Potentials for various compounds is included in this SOP.

The criteria above must be considered when preparing for a job. As a general rule of thumb, if we are investigating a completely UNKNOWN site, it is better to go with the instrument having the highest value eV lamp.

Zero Settings

- HNU PI 101: This instrument is zeroed electronically. No zero air is required.

- Tip II : This instrument is zeroed by use of zero air. The definition of zero air is ambient air drawn through an activated carbon scrubber. A coarse and fine zero control is present.

Calibration Gas (Non Zero Air)

Unless otherwise indicated by an "out-of-ordinary" project requirement, the following will always constitute the calibration gas specifications:

- o Isobutylene in nitrogen will be the calibration gas.

- o Two (2) different levels will be used, at approximately 10-20 ppm (LOW) and ~100 ppm (HIGH). The term approximately is used since the final concentration as received from the manufacturer is not known ahead of time. It is known, however, after receipt of the gas.

- o The high concentration gas (~100 ppm) will be the FIRST CALIBRATION GAS introduced into the analyzer. The actual value of this gas (in terms of ppm) will be set on the read-out scale.

The low level gas will then be introduced and its response (in terms of indicated value) will simply be recorded. No adjustments are made for this second gas standard.

The low level response will then be used to determine the linearity of the "calibration curve".

Calibrations

- o The following schedule lists the only required calibrations for soil vapor analysis where safety is not of paramount concern. Constant recalibrations are not required and in general are not justified based on the ultimate use of these field instruments.

0 - 4 hour survey: Initial and End of Day

4 - 8 hour survey: Initial, Middle of Day and End of Day

In those situations where Ambient Air monitoring is required in order to prevent worker exposure, calibration checks will need to be performed on a more frequent basis. These situations will be addressed in Work Plans (Safety & Health) based on job specifics. This SOP is not intended to cover worker exposure situations.

- o The following schedule lists what is required for each calibration type:

<u>INITIAL</u>	<u>MIDDLE OF DAY</u>	<u>END OF DAY</u>
Zero	Zero	Zero
High Std	High Std	High Std
Low Std	Possible Adjustments based on discussion	Low Std
Adjustments	below	No Adjustments

The Middle of Day Calibration Check (and also possibly other calibration checks made because you suspect real problems) is to be interpreted as follows after the zero adjustment for HNU and Zero Air adjustment for the Tip II have been made.

- HIGH STANDARD shows a Percent Difference of $> \pm 10\%$ from initial set in value, perform a complete recalibration. Prior to recalibration record the indicated Cal Check value.
- HIGH STANDARD shows a Percent Difference of $\leq \pm 10\%$ from initial set in value, simply record the indicated result. DO NOT RECALIBRATE. Do not measure the low standard - it is not necessary.

Equation

$$\% \text{ Difference} = \frac{\text{Initial Cal Value} - \text{Cal Check Value}}{\text{Initial Cal Value}} \times 100$$

Zero Adjustments During Sampling

Drift in the zero settings is inevitable and cannot be prevented. It is normal for these types of instruments. The following is to be observed when zero checks are performed.

- o Always check battery level first.
- o Never zero check the Tip II immediately after having used it for contaminated soil vapor analysis (> than the low standard). Allow the analyzer to draw in background air for at least 5 minutes before zero checking. Zero check with zero air (ambient air drawn through an activated carbon scrubber).
- o Always zero check the HNU by first placing the analyzer on a level surface with the probe lying next to it. This is an electronic check only - no zero air is required.

If either instrument indicates the necessity for zero adjustment, do not make it immediately. Give the analyzer a few more minutes and recheck.

Needed zero adjustments are to be made BUT no calibration gas adjustments are required at this time. Note that you will be checking calibration hold at the end of a 4 hour survey and/or in the middle and end of a longer survey. Zero adjustments made in between times will, if they affect the readings, be visible and accounted for by the calibration checks.

It is wise to have two carbon scrubbers on hand for zero air for the Tip II.

3.0 TIP II CALIBRATION

This instrument must have a zero air source as well as the isobutylene standards. Adjustment of zero knob will affect the span gas values to a certain degree. Therefore, calibrations where adjustments are required (such as initial calibration and possibly middle of day calibration) may need to be done by several adjustments of zero and span control knobs until proper response is present.

The Tip II has two zero controls. The COARSE control is a screwdriver adjustment located near the top of the probe assembly. As a general rule of thumb, the following should be done PRIOR to leaving for the field:

- Set ZERO knob to 5. Draw in zero air. If reading is not at zero, adjust the screw control until zero is achieved.

- This will then allow equal turns (both up and down) to be made in the field for calibration purposes.

The isobutylene standards are introduced into the Tip by means of a Tedlar bag or by simply filling a flexible plastic bag and holding it over the Tip intake. Always make sure that zero and span knobs are locked after adjustments have been made.

Initial Calibration

- o Analyze zero air and adjust to zero (+1 of zero)
- o Analyze HIGH standard and adjust reading of the scale to the standard value by the SPAN control knob (+1% of known value)
- o Repeat above until no changes are required
- o Analyze LOW standard and record its indicated value
- o Always record ZERO and SPAN settings

Middle of Day Calibration

- o Analyze zero air and adjust to zero
- o Analyze HIGH standard and calculate the % difference.
Record this value. Then act according to following:
 - If $\leq 10\%$ (+), no recalibration is necessary
 - If $> 10\%$ (+), recalibrate

End of Day Calibration

- o Analyze zero air and record its reading - do not adjust
- o Analyze HIGH and LOW standards and record readings
- o Calculate % difference for high standard and record its value

4.0 HNU PI 101 CALIBRATION

Two differences exist between the Tip and HNU, as follows:

- o HNU requires NO zero air - it is zeroed electronically
- o HNU has Range scale knobs which must be used to measure readings which differ by factors of ~10. The Tip has an autoranging electrometer and does this for you automatically.

The HNU should be placed on a flat, level surface prior to calibration. Always make sure that the SPAN control is locked after adjustment. Standards are introduced into the analyzer by means of a Tedlar bag or by filling a flexible "baggie" and allowing analyzer to sample its content.

Initial Calibration

- o With unit in stand by mode, adjust zero control for zero reading (±1 of zero).
- o Set unit to Range 200, introduce the HIGH standard and adjust scale reading to the standard value by the SPAN control.
- o Analyze LOW standard and record its value.

Middle of Day Calibration

- o Adjust zero
- o Analyze HIGH standard and calculate the % Difference.
Record this value.
 - If <10% (±), no recalibration is necessary
 - If >10% (±), recalibrate

End of Day Calibration

- o Check zero reading and record its value - do not adjust.
- o Analyze HIGH and LOW standards and record their values.
- o Calculate % Difference for the HIGH standard and record its value.

5.0 FIELD MONITORING PROCEDURES

A number of field techniques are available for determining soil vapor Volatile Organic Compound (VOC) concentrations. The two most common methods are Hole Punch procedures and headspace analysis. The technique chosen depends on the project specifications.

Prior to soil vapor monitoring, locations and/or depths are chosen based upon a systematic grid, a random grid or by visual inspection of an area.

5.1 Background Soil Vapor Definition

A background soil sample must be analyzed in order to properly interpret the results obtained with the analyzer. The background sample should be obtained from an area where contamination is unlikely to exist. Also, the background soil sample must be a similar geologic material compared to the material to be analyzed.

Drift and instability of these analyzers makes determination of "what is background" an exceedingly difficult chore. This is further compounded by digital readouts capable of presenting results to 0.1 ppm units.

After proper analyzer calibration procedures, the background interpretation is to be based on observed readings as follows:

Observed Background Reading

0 - 2

Greater Than 2

Background is Defined As

2

Maximum reading noted
which is repeatable and
expressed as a whole
number

Background is designated as B under sample Type in our field sheets. Observed Background is recorded under PPM. The Defined Background (based on above) is then entered in the comments column.

5.2 Interpretation of Sample Readings

The following guide is presented when interpretation of field sample readings is required on the spot by field personnel.

<u>Background(B)</u> <u>Definition</u>	<u>Observed Sample</u> <u>Reading</u>	<u>Consider Sample</u> <u>Contamination</u>	
		<u>Unlikely</u>	<u>Possible</u>
2	2 - <4	X	
2	<u>></u> 4		X
3	3 - <5	X	
3	<u>></u> 5		X
4	4 - <7	X	
4	<u>></u> 7		X
5	5 - <8	X	
5	<u>></u> 8		X
<u>></u> 6	B - <1.5B	X	
<u>></u> 6	>1.5B		X

5.3 Hole Punch Soil Vapor Monitoring Method

Once locations have been chosen and sampling depths determined, soil vapor monitoring is performed using a hole punch and field PID instrument. The hole punch consists of a four foot long hollow stemmed stainless rod probe connected to a 0.5-foot long, slotted screen which is driven into the ground using a 40-pound hammer. The stainless steel rod is lined with Teflon tubing, which is connected to the screen at one end and the field PID instrument at the other. If the field PID instrument used is a Tip II analyzer, it is allowed to draw the soil vapors from the desired depth with its own pump. If it is a HNU analyzer, the soil vapors are drawn to the instrument using a squeeze bulb tied into the line.

If the field PID readings do not indicate ambient conditions when exposed to the surrounding air or if the screen is clogged with soil, the screen is replaced. the screens are decontaminated using zero air and/or deionized water.

5.4 Headspace Soil Vapor Monitoring Method

Once the split-spoon/hand auger sample is collected from the bore hole, part of the sample is used to monitor the soil vapors from the boring.

Using a clean stainless steel spatula portions of the split-spoon/hand auger sample are collected into a glass jar.

Aluminum foil is used to seal the jar. The samples are then warmed for a predetermined amount of time, then headspace analysis is performed. The aluminum foil is punctured with the tip of the PID instrument and the soil vapors measured.

When recording the headspace results, always indicate the minutes used to equilibrate the soil inside the jar prior to reading (per instructions on the soil vapor field analysis record sheet).

Temperature conditions to which all jars are exposed should be approximately the same during the course of the day. These conditions are to be annotated in the Comments section of the field sheet.

PHOTOIONIZATION POTENTIALS
COMMON ENVIRONMENTAL CONTAMINANTS

<u>Non-Halogenated Compounds</u>	<u>eV</u>	<u>Halogenated Compounds</u>	<u>eV</u>
Acetone	9.69	Chloroform	11.42
Benzene	9.245	Carbon Tetrachloride	11.47
Carbon Disulfide	10.08	Chlorobenzene	9.07
Diethyl Ether	10.48	c/t-1,2-Dichloro- ethylenes	9.6
Ethyl Benzene	8.76	Freons (Majority)	11 - 12
Isobutylene	9.23	1,1,1-Trichloroethane	>11 <11.7
Methyl Ethyl Ketone	9.53	Tetrachloroethylene	9.32
Methyl Isobutyl Ketone	9.30	Trichloroethylene	9.45
Styrene	8.47	Vinyl Chloride	9.9995
Toluene	8.82		
Xylenes	8.5		
Water Vapor	12.59		

Notes:

1. As can be seen from the above, if we analyzed soil vapor from a site contaminated with 1,1,1-Trichloroethane using the Tip II Oq 10.5 eV lamp, we would show NO SOIL CONTAMINATION.
2. More extensive listings are available in the HNU Manual and in other reference books such as the Physics and Chemistry Handbook.